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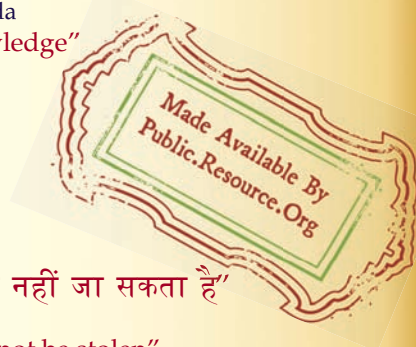
IS 5321 (1969): Soda lime (as carbon dioxide absorbent)
[CHD 1: Inorganic Chemicals]



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Indian Standard
SPECIFICATION FOR SODA LIME
(AS CARBON DIOXIDE ABSORBENT)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

Gr 3

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Indian Standard

SPECIFICATION FOR SODA LIME (AS CARBON DIOXIDE ABSORBENT)

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SPECIFICATION FOR SODA LIME (AS CARBON DIOXIDE ABSORBENT)

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 26 August 1969, after the draft finalized by the Inorganic Chemicals (Miscellaneous) Sectional Committee had been approved by the Chemical Division Council.

0.2 Soda lime intended for use as carbon dioxide absorbent is known in the trade by different names, such as lissasorb, protosorb and carbosorb. Particle size is an important characteristic for the material. It is sieved and so blended as to eliminate small granules which cause excessive resistance to respiration and large granules which give inefficient absorption.

0.3 Soda lime is a mixture of variable proportion of calcium oxide/hydroxide and sodium hydroxide. It is advisable to use hard limestone as the source of lime. In order to achieve hardness, cement is sometimes added. The optimum range of sodium hydroxide content to confer the required properties of the soda lime has been found to be between 3.0 and 3.5 percent.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS. 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and tests for soda lime intended primarily for use as carbon dioxide absorbent in respirators.

1.1.1 It does not include the material used for medical purpose in closed-circuit anaesthetic apparatus.

2. REQUIREMENTS

2.1 Description — Soda lime shall be in the form of granules free from foreign matter. It shall be sieved and blended so that the size grading of the finished product is as specified in 2.3.

*Rules for rounding off numerical values (revised).

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2.2 The material shall comply with the requirements specified in Table 1 when tested according to the methods prescribed in Appendix A. Reference to the relevant clauses of Appendix A is given in column 4 of the table.

TABLE 1 REQUIREMENTS FOR LIME

SL No	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO CL No. IN APPENDIX A)
(1)	(2)	(3)	(4)
i)	Moisture, percent by weight, <i>Min</i> <i>Max</i>	16.0 19.0	A-2
ii)	Hardness number, <i>Min</i>	70	A-3
iii)	Activity, minutes, <i>Min</i>	55	A-4

2.3 Size Grading — When tested by the method prescribed in Appendix B, the sizes of the grains constituting the material shall be within the following limits

<i>IS Sieve Size</i>	<i>Percent by Weight, Max</i>
Retained on 2.80-mm	1.0
Passing through 2.80-mm and retained on 2.00-mm	40.0
Passing through 1.40-mm and retained on 600-micron	10.0
Passing through 600-micron	1.0

3. PACKING AND MARKING

3.1 Packing — Soda lime shall be supplied in sound, clean, dry, air-tight packages.

3.2 Marking — Each package shall be legibly and indelibly marked with the following information.

- Name of the material;
- Net weight of the contents;
- Year of manufacture;
- Manufacturer's name and his recognized trade-mark, if any; and
- Lot number to enable the batch of manufacture to be traced from records.

3.2.1 The containrrs may also be marked with the ISI Clertification Mark.

NOTE— The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution

4. SAMPLING

4.1 The method of drawing of drawing representative samples of the material, number of tests to be performed and the criteria of finding the conformity of the material to the requirements of this specification shall be as prescribed in Appendix C

APPENDIX A

(Clause 2.2, Table 1)

METHODS OF TEST FOR SODA LIME

A-0. QUALITY OF REAGENTS

A-0.1 Unless specified otherwise, pure chemicals and distilled water (see IS 1070-1960*) shall be used in tests

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis

A-1. PREPARATION OF SAMPLE

A-1.1 Mix the sample well by rotating the bottle several times and transfer a portion immediately into a wide-mouthed bottle and stopper it. Take care that no pieces of sealing wax get mixed with the sample and the sample is not exposed unduly for a long time to atmosphere. Use this *prepared* sample for test purposes.

A-2. DETERMINATION OF MOISTURE

A-2.1 **Procedure** — Introduce into a tared weighing bottle approximately 5 g of the sample and weigh. Remove the stopper and place the weighing

*Specification for water, distilled quality (revised)

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bottle and stopper in a well ventilated oven at $150^{\circ} \pm 2^{\circ}\text{C}$. for 2 hours Transfer the weighing bottle to a desiccator containing silica gel freshly regenerated at 150°C Replace the stopper and allow to cool for 30 minutes. Remove the stopper momentarily and weigh again.

A-2.2 Calculation

$$\text{Moisture, percent by} = \frac{W_2 - W_3}{W_2 - W_1} \times 100$$

where

W_2 = weight in g of the sample and the weighing bottle,

W_3 = weighting of the sample and weighing bottle after drying, and

W_1 = weight in g of the weighing bottle

A-3. DETERMINATION OF HARDNESS

A-3.1 Apparatus

A-3.1.1 A pan 20 cm in diameter, 12.5 cm depth having a concave bottom 8 mm thick at the rim and 5 mm thick at the centre, provided with a lid.

A-3.1.2 Steel Balls – 8 mm diameter of type used in ball bearings (see IS 2898-1965*).

A-3.1.3 Mechanical Shaker — With a frequency of oscillation of 285 ± 3 cycles per minute.

A-3.2 Procedure — Weigh 50 g of the sample from which material retained on 2.00-mm IS Sieve and material passing 1.40-mm IS Sieve have been removed. Transfer it to the pan and place 15 steel balls in the pan. Cover the pan with the lid and shake in a shaker for exactly 30 minutes. At the end of this time, remove the steel balls carefully and brush any adhering fine particles back into the pan. Transfer all the material in the pan to a 1.40-mm IS Sieve and shake for 3 minutes in the shaker. Transfer the material retained on the sieve to a tared dish and weigh. Any particles lodging between the meshes of the sieve shall not be transferred to the dish.

A-3.3 Calculation

Hardness number = $2A$

where

A = weight in g of the soda lime retained on the sieve,

*Specification for chromium alloy steel balls

A-1. DETERMINATION OF ACTIVITY

A-4.0 General — Activity is determined by the time taken by carbon dioxide to penetrate a soda lime column under prescribed conditions of the test

A-4.1 Apparatus — as shown in Fig I. The absorption tube A shall be of 3.0 ± 0.1 cm diameter and 105 ml capacity

A-4.2 Reagents

A-4.2.1 Sodium Hydroxide — Barium Chloride Solution — Dissolve 4 g of sodium hydroxide and 20 g of barium chloride in water and make up the volume to one litre

A-4.3 Procedure — Fill the absorption tube A with soda lime as received. The tube shall be filled by adding the soda lime in approximately 10 g increments, each addition being followed by gentle side-tapping of the tube to achieve good packing

A-2.3.1 Pass carbon dioxide at the rate of 150 ml per minute controlled by flowmeter with an flowmeter with an flowing at the rate of 3 litres per minute controlled by flow meter B through water saturator G and H at 20°C to bring the relative humidity of the gas stream to at least 95 percent before going through the absorption tube. The ambient air, during the period of test shall be at a temperature of $20^{\circ} \pm 2^{\circ}\text{C}$. Pass the effluent from the absorption tube through bubbler D containing sodium hydroxide-barium chloride solution.

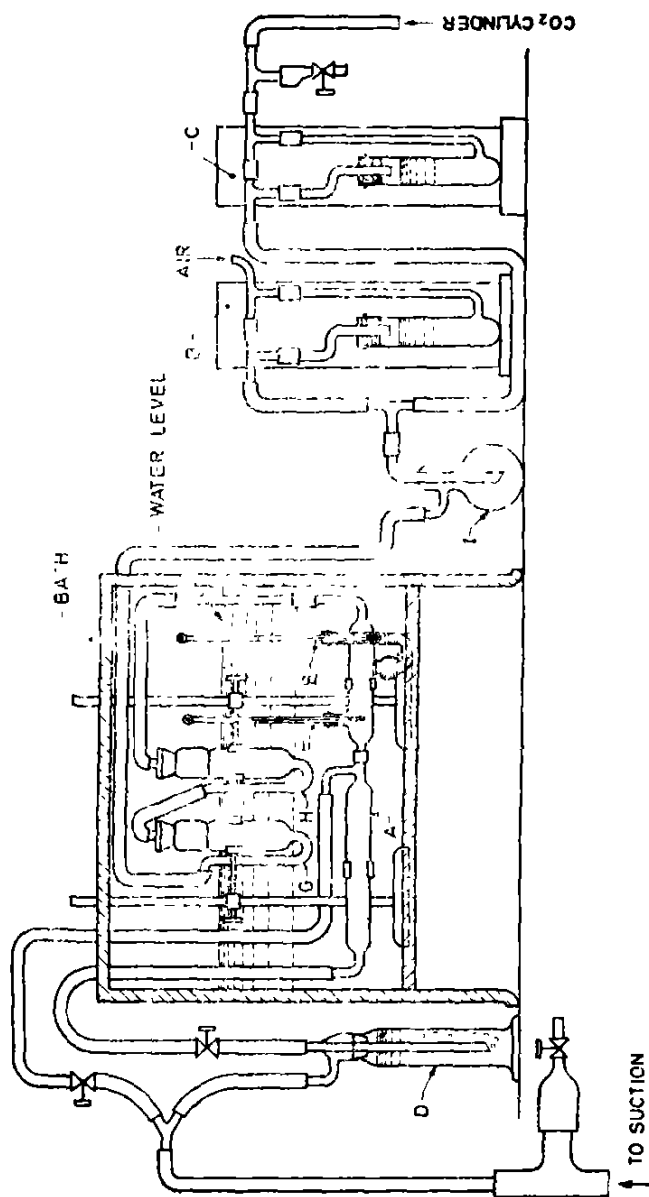
A-4.3.2 When the soda lime fails to adsorb the whole of the carbon dioxide in the gas stream the solution in the bubbler would become turbid. Immediately this is observed, connect a fresh bubbler and, if the solution becomes turbid in two minutes, the end point shall be considered to have been reached. The time from the commencement of the test to the beginning of the two minutes period shall be the 'initial penetration time'. If the solution is not turbid at the end of the two minutes period, connect another bubbler and repeat the process until this occurs in two minutes.

APPENDIX B

(Clause 2.3)

SIZE GRADING OF SODA LIME**B-1. PROCEDURE**

B-1.1 Distribute a weighed quantity of soda lime (approximately 100 g) on the coarsest sieve of a nest consisting of 2.80-mm, 2.00-mm, 1.40-mm



- A = absorption tube
- B = flow meter to adjust air flow at the rate of 3 litres per minute
- C = flow meter to adjust rate of CO_2 at the rate of 150 ml per minute
- D = bubbler containing sodium hydroxide-barium chloride solution
- E = wet bulb thermometer
- F = dry bulb thermometer
- G & H = bubbler containing distilled water
- I = safety trap

FIG. 1 APPARATUS FOR ACTIVITY TEST

and 600-micron IS Sieves of 20 cm diameter each. Fix the nest of sieves rigidly in a mechanical sieve shaker, following the approximate instructions supplied by the manufacturer of the machine. Shake for exactly 5 minutes and then remove the sieves from the shaker

B-1.2 Weigh the amount of soda lime remaining on each sieve and the fines passing into the ???. Any granules which ??? in the ??? of a sieve shall be rubbed through on in the next finer and shall be weighed with the material retained on the finer sieve.

NOTE — Take special care to clean the sieves thoroughly after use so that all traces of soda lime are removed

APPENDIX C

(Clause 4.1)

SAMPLING OF SODA LIME (AS CARBON DIOXIDE ABSORBENT)

C-1. GENERAL REQUIREMENTS OF SAMPLING

G-1.0 In drawing, preparing, storing and handling test samples, the following precautions and directions shall be observed

C-1.1 Samples shall not be taken in an exposed place.

C-1.2 Precautions shall be taken to protect the samples, the sampling implement and the containers for samples from accidental contamination through harmful contact and exposure

C-1.3 The samples shall be placed in clean, dry, airtight containers made of glass or other suitable material.

C-1.4 Each sample container shall be sealed airtight with a stopper after filling and marked with full details of sample, the date of sampling and other identification particulars.

G-1.5 The samples shall be stored in such a manner that during storage the properties of the material do not got affected.

C-2. SCALE OF SAMPLING

C-2.1 Lot — In a single consignment all the containers of soda lime from a single batch of manufacture shall constitute a lot.

C-2.1.1 For ascertaining the conformity of the lot to the requirements of the specification, tests shall be carried out for each lot separately.

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C-2.2 The number of containers (n) to be selected for sampling shall depend on the size (N) of the lot and shall be in accordance with Table 2.

TABLE 2 SCALE OF SAMPLING

LOT SIZE	No. OF CONTAINERS TO BE SELECTED
N	n
(1)	(2)
Up to 25	3
26 „ 50	4
51 „ 100	5
101 „ 200	6
201 and above	8

C-2.3 These containers shall be selected at random from the lot. To ensure the randomness of selection, a random number table, as agreed to between the purchaser and the supplier shall be used (*see also* IS : 4905-1968*). In case such a table is not available, the following procedure shall be adopted:

Starting from any container, count them as 1, 2, 3, . . . up to r and so on, where r is the integral part of N/n . Every r th container thus counted shall be taken to give the required sample size.

C-3. PREPARATION OF TEST SAMPLES

C-3.1 From each of the containers selected according to C-2.3, a representative portion of soda lime weighing about 200 g shall be taken. These portions shall be thoroughly mixed to give a composite sample weighing at least 1.5 kg. The composite sample shall be divided into three equal parts, one for the purchaser, another for the supplier and the third to be used as a referee sample

C-3.2 The three parts of the composite sample shall be transferred to separate containers and shall be sealed and marked with full identification particulars.

C-4. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

C-4.1 The test for determining the activity time shall be done in duplicate, For all the other characteristics one test each shall be conducted. The required material shall be taken from the composite sample prepared according to C-3.1.

C-4.2 The lot shall be considered as conforming to the specification if all the test results (C-4.1) satisfy the corresponding requirements given in 2.

*Methods of random sampling

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